NITRILOTRIACETIC ACID

CAS Registry Number: 139-13-9 $N(CH_2COOH)_3$

Molecular Formula: $C_6H_9NO_6$

Nitrilotriacetic acid is a crystalline compound that is insoluble in water and most organic solvents. It can form mono-, di-, and tri-basic salts that are soluble in water (U.S. DHHS, 1983). Nitrilotriacetic acid emits toxic fumes of nitrogen oxides when it is heated to decomposition (Sax, 1989).

Physical Properties of Nitrilotriacetic Acid

Synonyms: triglycollamic acid; tri(carboxymethyl)amine; triglycine; NTA; aminotriacetic acid

Molecular Weight:	191.14
Melting Point:	240 °C with decomposition
Solubility in water:	59 g/L at 25 °C
Vapor Pressure (estimated):	3×10^{-5} mm Hg at 25 °C
Density/Specific Gravity:	> 1 at 20 °C (water = 1)
Conversion Factor:	1 ppm = 7.82 mg/m^3

(HSDB, 1993)

SOURCES AND EMISSIONS

A. Sources

Nitrilotriacetic acid is used as a sequestering and chelating agent, a builder in synthetic detergents, an eluting agent in purification of rare-earth elements, a boiler feedwater additive, in water treatment, and in pulp and paper processing (HSDB, 1993).

B. Emissions

No emissions of nitrilotriacetic acid from stationary sources in California were reported based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

No information about the natural occurrence of nitrilotriacetic acid was found in the readily-available literature.

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of nitrilotriacetic acid.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of nitrilotriacetic acid was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Based upon its estimated vapor pressure, nitrilotriacetic acid can exist in both the vapor and particulate phases in the ambient atmosphere. Nitrilotriacetic acid in the particle phase is subject to wet and dry deposition. The average half-life and lifetime for particles in the atmosphere is about 3.5 to 10 days and 5 to 15 days, respectively (Atkinson, 1995; Balkanski et al., 1993).

AB 2588 RISK ASSESSMENT INFORMATION

Although nitrilotriacetic acid is reported as being emitted in California from stationary sources, no health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program, Revised 1992 Risk Assessment Guidelines for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to nitrilotriacetic acid are inhalation and ingestion.

Non-Cancer: Nitrilotriacetic acid is toxic to the kidney (Amdur et al, 1991). A small amount of nitrilotriacetic acid is retained in bone, due probably to its property as a chelator of metals. It is not teratogenic to rats, mice, or rabbits (Reprotox, 1995).

Cancer: The sodium salt is tumorigenic in rats at high dietary levels (Amdur et al, 1991). The United States Environmental Protection Agency has not evaluated nitrilotriacetic acid for carcinogenicity (U.S. EPA, 1995a). The International Agency for Research on Cancer has classified nitrilotriacetic acid and its salts in Group 2B: Possible human Carcinogen, based on sufficient evidence in animals (IARC, 1990a).

The State of California has determined under Proposition 65 that nitrilotriacetic acid and nitrilotriacetic acid trisodium salt monohydrate are carcinogens (CCR, 1996). The inhalation

potency factor that has been used as a basis for regulatory action in California is 1.5×10^{-6} (microgram per cubic meter)$^{-1}$ (OEHHA, 1994). In other words, the potential excess cancer risk for a person exposed over a lifetime to 1 microgram per cubic meter of nitrilotriacetic acid is estimated to be no greater than 1.5 in 1 million. The oral potency factor that has been used as a basis for regulatory action in California is 5.3×10^{-3} (milligram per kilogram per day)$^{-1}$ (OEHHA, 1994).